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SCHOOL GROUNDS

THEIR DESIGN AND DEVELOPMENT

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FOREWORD.

Modern education seeks to contribute to the expansion of the life of the child by providing an environment of beauty—buildings of pleasing architecture and grounds with the charm of landscape gardening. Our school grounds should be attractive, placed where they will conveniently serve their tributary districts according to the best standards of city planning, large enough and of such well chosen topography as to provide amply for playgrounds, parking, borders, and gardens, all so judiciously planned, that their orderliness and obvious wisdom of arrangement become elements of beauty in the unity of the whole.

It is advisable to have a well studied plan for every school ground, regardless of size. A definite portion of the funds allotted for building purposes ought to be set aside for the development of the grounds, in the very smallest districts as well as in those which can afford to secure the professional services of a landscape architect.

A worthy appreciation of artistic school buildings has been created during recent years, especially in the cities, and in the more progressive rural districts. Construction should be the basis of building design. With this in mind, false fronts are to be avoided, especially that too prevalent imitation of the "mission" style with weird scrolls concealing a simple gabled roof.

Closely following the desire for good architecture has come an understanding of the value of landscape development.

Our schools have assumed a more important role in community life through the wider use of the buildings and playgrounds as public meeting places. The location of such an important feature should receive careful consideration from the viewpoint of modern city planning.

LOCATION AND SIZE OF SCHOOL SITE.

The tendency in educational progress has been toward consolidation of schools in rural districts and segregation of schools in the cities.

Commodious areas are available for the consolidated rural schools, for which ten to twenty-five-acre sites should be provided. By judicious selection, a choice bit of local scenery may be included in the site: a fine group of trees, for example, or a beautiful outlook.

In the cities, the trend is toward segregation into three classes, the elementary schools, the junior high schools, and the senior high schools with junior college courses often added. The elementary schools should be evenly distributed over the city, providing classrooms within easy walking distance of the youngest child. Various authorities have agreed that this is about a half mile. The junior high schools may be approximately two miles apart in a well populated city. High schools may be much farther from the center of population. In practice it has often been necessary to place high schools on the outskirts of the city in order to secure the requisite area. If easy transportation is available, this is undoubtedly better than cramped quarters in a downtown location.

School grounds are rarely large enough. In cities, years ago, it was the custom to set aside not more than a block of land for a school site. After subtracting the space occupied by the building, little was left for either play or planting.

The site should be mainly level or one that can easily be graded into level areas. In general it is more economical to purchase a level acreage, since grading is expensive.

Ill drained sites are to be avoided. The soil should be fertile and loamy so that school gardens and ornamental planting will flourish. The heavier soils prove troublesome in wet weather when mud is carried into the building from the playground.

Quiet is obviously necessary for study. Where the site is sufficiently large, the noise factor is not so obtrusive and even though the grounds face a busy thoroughfare the building may be set back with generous space in front so that noises will not be disturbing.

Where the grounds are small so that the building must of necessity be near the street, the site chosen should be on a side street off the main line of traffic.

Sites adjacent to factories, hospitals, fire hazards, cemeteries, stables, and slaughterhouses should be avoided. The maintenance of a desirable environment for the pupils may be secured by appropriate local ordinances.

THE SCHOOL PLAYGROUND.

Playgrounds are to be considered as much expanded open air exercise floors to be equipped for physical training, including the play activities of children and adults.

Since the school playgrounds are placed where the children live, it is a matter of efficiency and economy that they be made sufficiently large and beautiful so as to accomplish all that is expected of the separate park playground.

PLAYGROUND OF THE ELEMENTARY SCHOOL.

A wise division of areas is important in school playgrounds in order to provide easily separable units for boys, girls, and small children. These three elements will require specialized treatment and should be

maintained to a degree as separate enclosures, securing the necessary isolation by erecting fences or pergolas covered with vines or screened by rows of trees, by belts of shrubbery, or isolated by means of embankments between grades covered with planting.

Small children's playground.

Provision may often be made for the small children in an angle or court between wings of the building. At all events the place reserved for them should be well protected from the rougher play of the other children, and close to the building. Much can be done to make this a charming spot with pergolas, shelters, benches, garden plots, and more trees and shrubs than the other sections permit. The element of beauty should be strongly insisted upon and the whole should be well designed with pretty details carefully disposed. The usual sandbox made of two-inch planks may be provided or it may take more permanent form with concrete coping. It must be placed in a sunny location where the sand will readily dry during the rainy season. Even the slides may be of attractive design as the heavy pipe structures are not necessary for the little ones.

The main consideration will be plenty of clear space with the few features or pieces of apparatus so arranged that they do not interfere with the openness of the center, which is so necessary for the group games of the younger children.

Girls' playground.

An error often committed in school playground design is the slighting of the girls' playground. Provision should be made for indoor baseball, volley ball, basketball, and tennis, as well as ample area for general play.

The tennis, basketball, and volley ball courts should be so placed that they do not interfere with the large open space reserved for general games.

Apparatus should not be overdone but a limited amount is necessary. A horizontal overhead ladder is particularly valuable for girls, while a gymnasium frame with traveling rings, climbing ladder, climbing ropes, and a horizontal bar will afford good exercise.

There should be at least one basketball court, one tennis court, two volley ball courts, and one handball court, which, allowing for space between courts, will require 20,000 square feet of area.

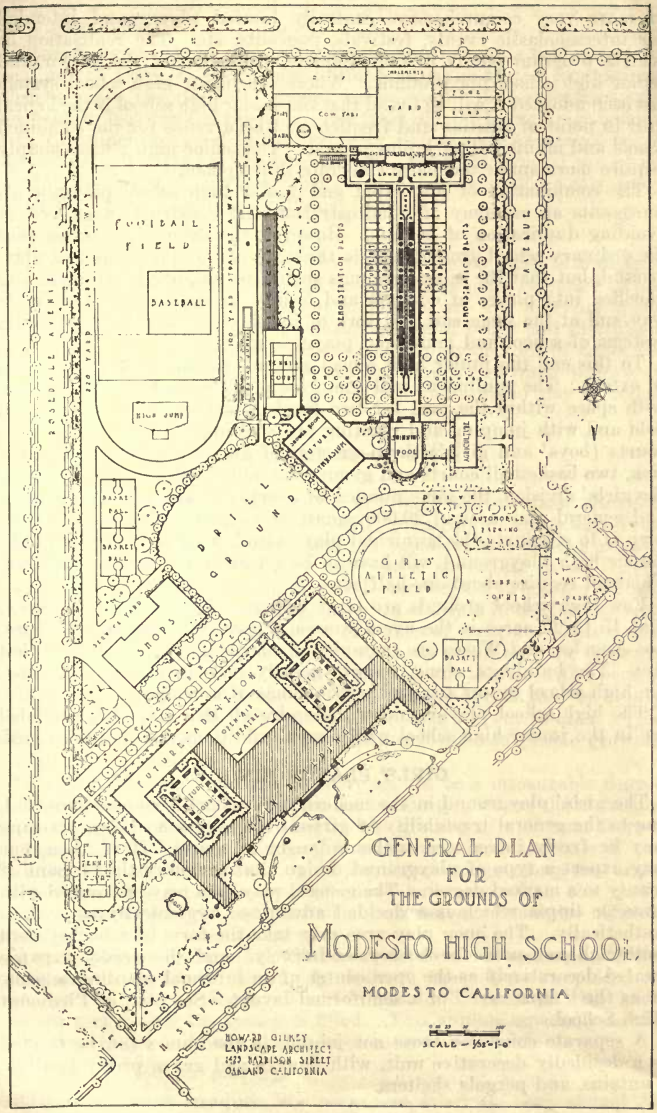
The open play space should be at least 135′ x 135′, or 18,225 square feet in area. Thus the girls' playground alone under satisfactory conditions will require an acre of land.

Boys' playground.

The boys will require the same general features, providing another handball court or two, and doubling the open play space so that baseball and soccer football games can be played. This will utilize 2½ acres of ground.

JUNIOR HIGH AND HIGH SCHOOL PLAYGROUNDS.

The problem of the playground for high schools and junior high schools is essentially that of the municipal playground. In fact, the trend of present day thought has been toward the elimination of city playgrounds except as adjuncts to schools and the provision for one



GENERAL PLAN FOR THE GROUNDS OF MODESTO HIGH SCHOOL

MODESTO CALIFORNIA

SCALE — 1/32-1'-0"

or more very comprehensive centrally located playground intended for interscholastic events, festivals, pageants, etc. The realization of such a program points to the complete utilization of the junior and senior high school playgrounds. Where the junior high school system has been adopted it will be found that the junior high school is the logical unit in point of location and frequency of occurrence for the combined school and municipal park playground. The senior high schools simply require more space and more elaborate development.

The combination of municipal and junior high school playgrounds represents an economy of administration and construction as well as avoiding duplication of layouts. However, the assumption is not that the ordinary school ground will do the work of the fine municipal playground, but that the school grounds should be amplified, enlarged, and glorified into places of comfort and beauty to accomplish in a better way and at the same cost the work of indifferently successful separate systems of school and municipal playgrounds.

To this end the junior high school grounds should average ten acres in extent. The equipment will comprise a quarter-mile running track with space within the oval for two baseball diamonds or one football field and with jumping and vaulting pits totaling 4½ acres; four tennis courts (boys' and girls') three-quarters of an acre; in the boys' division, two basketball courts and gymnasium apparatus, one-half acre; in the girls' division, the same number of courts and amount of apparatus and general play area of 20,000 square feet—totaling an acre. If the plan is to eliminate the municipal playground, a separate corner of the junior high playground will have to be set aside for smaller children. This will require about one-half acre.

Few high school grounds are large enough. Experience has proved that 15 to 20 acres is the average area necessary. Modesto, Ventura, Los Angeles, and Wasco are examples of schools having grounds of that size. The buildings, alone, require greatly increased space. In fact, the high school group attains the semblance of a campus.

The high school playground will require all that has been provided for in the junior high school with several additions and amplifications.

GIRLS' PLAYGROUND.

The girls' playground in the modern high school is commodious and, due to the general tractability of girls of the high school age, planting may be freely introduced without danger of abuse. Here, then, one may expect a type of playground design that embodies the element of beauty to a marked degree. The general play area may be covered with grass or lippia which is a decided advantage hygienically as well as aesthetically. The open play area may take the form of a hockey field (although not used for hockey exclusively) and the grassy expanse treated decoratively as the open center of an informal planting scheme, or as the "tapis vert" of a semiformal layout. See plan of Piedmont High School.

A separate court for those not joining in the games can be treated as a decidedly decorative unit, with flowers and grass, pretty benches, fountains, and pergola shelters.

Boys' playground.

Everything should be done to make the boys' athletic field complete, locating the track as previously outlined adjacent to the gymnasium. Bleachers are essential and should be so placed that spectators will not have to look toward the sun. The track should be well constructed with three-inch redwood curbs and with coarse rock or gravel below the surface, tile-drained where necessary. With the general use of oil for fuel in this state, cinders have become obsolete or too costly when imported. Some other material must be used.

Rally court.

Most school auditoriums have been found to be too small to accommodate the entire student body at one time. Rallies must therefore either be held twice or those who can not find space are left loitering about the building and grounds to the disadvantage of order and discipline. All this may be avoided when ample space is provided out of doors for a rally court. If located close to the building an elevated terrace or balcony may be used as a speaking platform and a piano may be rolled out upon the stage thus provided.

DEVELOPMENT OF SITE.

Grading.

Often little thought is given to the grading problems until after the completion of the building. As a result, quantities of earth have been removed from the building site when the basement and footing excavations were made. The dirt may have been spread about as it was removed, leaving the subsoil on top and covering the original good soil several feet below—often covering, too, piles of debris in the form of iron scraps, refuse wood blocks, and rejected lumps of concrete. This condition should be obviated by saving the top soil, which must be removed while grading. It should be reserved in piles for use when the permanent grades have been established. Then this good earth may be evenly distributed not less than two feet in depth over the entire area. This requires double handling of the top soil but insures favorable growing conditions at a small additional cost.

In establishing the final grades there should be a measurable degree of slope in all directions away from the building. Where the structure is placed upon a hillside, this demands the grading of a distinct terrace on the uphill side of the building, sloping away from the base of the building with an open gutter or ample tile drainage along the lower side. Sometimes a simple reverse curve will accomplish the result where the slope is slight and rainfall not excessive. Example—Atascadero High School.

Any portion of the site that will be subject to excess water during the rainy season should be thoroughly drained, the tile being placed in trenches two feet in depth. The tile should be covered with loose crushed rock before the trench is filled. This applies especially to the areas close to the buildings and to lawn covered playfields.

Preparation of soil for planting.

After the rough grading has been completed the soil should be carefully prepared for planting. Additional care with this stage of the work will prove profitable in the increased vigor of growth and in the

length of life of the plants. As early as possible the soil should be well limed if it is at all heavy or sour. Even where the soil is not heavy or sour, the lime tends to make the necessary plant foods more available. Apply lime early so that it may react with the soil chemicals and become neutralized before the later application of manure. Avoid applying the two at the same time or much nitrogen will be lost in the release of ammonia. Use lime at the rate of ten to twenty pounds per hundred square feet.

Manure is essential and should be applied as heavily as funds will allow, never less than an inch deep over all areas to be planted. In this state the chief value of stable manure is that of moisture retention, so it should not be worked in deeper than the top six inches of soil. If the surface is kept well stirred after each irrigation, the amount of water saved will more than pay for the cost of the manure.

After the soil has been thoroughly worked into condition, the final shaping and finished grading will leave the surface smooth and fine, free from lumps and depressions.

Planting of lawns.

Much of the discouragement of lawn making comes from lack of careful preparation. After the soil has been prepared as outlined above, a period of time should elapse during which the soil is watered and the weeds are removed as long as they appear in quantity. Then the earth should be finally raked preparatory to sowing the seed. This is sown at the rate of one pound to every 200 square feet.

The ideal lawn is that of Kentucky blue grass which is unexcelled for color and texture. It is a perennial and spreads slowly, repairing losses as it grows. However, it is slow to start and should never be planted at a season too cold for ordinary garden crops. Many gardeners prefer to plant rye grass or white clover as nurse crops so that the weak early growth of the blue grass may receive protection. Rye grass alone is much planted on sandy soils near the coast where the quick effect is considered an asset.

Upon sowing the seed it should be raked in very lightly. Authorities differ as to choice of material for top dressing and even as to the advisability of using any mulch. Sawdust and shavings, especially when well decayed, have been used successfully and have the advantage of being free from weeds. Leaf mold from hardwood trees is excellent when procurable. Fresh manure is to be avoided even though of requisite fineness owing to the prevalence of weed seeds in it. Probably the best procedure is to reserve some of the manure used in the general soil preparation. Mix this material with equal amounts of light loam and spread out thinly in an unused part of the grounds, keeping it well watered and frequently stirred until used.

Planting operations.

Where a planting plan has been prepared such as that illustrated in this bulletin, the placing of the plants becomes a mechanical operation. Smooth stakes of light-colored wood about 1″ x 1″ x 12″ may be prepared in advance by manual training classes. The location of each plant then becomes a matter of using a scale and reading distances from the plan and transferring these to the ground by means of a tape

line or a long measuring stick and setting one of the prepared stakes in the ground, numbered as indicated on the plan.

After staking out is completed, minor adjustments can easily be made before the actual planting begins. Then by referring to the key, the various shrubs, trees, vines, etc., can be quickly set by their proper stakes. Unless persons entrusted to the job of installing the planting are thoroughly familiar with all the varieties, it will be well to caution the nurseries to label very carefully. Here it will be well to note that great care should be taken in the selection of plants at the nurseries, avoiding plants whose growth has been stunted by remaining too long in the pot or can before shifting. It will be easy to avoid those that appear prematurely woody, gnarled and leggy, but often the pot bound plant can only be detected by removing it from its pot. The roots should show fresh growing tips and observation should be made to note any objectionable coil of roots at the bottom of the pot. A small, bushy specimen is to be preferred to a larger plant that is woody and leggy. It is further advised where shrubs are balled from the open ground that they remain with the nurseryman at least a month after having been dug. Holes for each plant will vary according to the size of the pot in which it was grown or the ball of earth about it. It is a safe procedure to make the hole twice as wide and twice as deep as the pot or ball. A small amount of well rotted manure may be worked into the earth at the bottom of the hole.

Where roots are pot bound, the mass of roots should be scored with a sharp knife. Naked rooted shrubs and trees (deciduous) should have all injured roots pruned away and great care should be taken to firmly place fine earth about each root.

Balled plants should never be carried by their stems, but should be carefully supported under the burlap. Do not remove the sacking. In placing the plant, merely cut the tie ropes, then shovel the hole full of loose earth and tamp it tightly around the ball. After this the top flaps of the sack may be laid back and completely covered with top soil.

In most cases plant, only slightly deeper than the original depth in the nursery, leaving a depression or saucer to be filled with mulch to insure retention of water.

The majority of plants will need a firm stake, especially during the rainy season, for a year or two. Care should be taken not to cut the stems of the shrubs or trees with tying material. All plants should be inspected and wire labels removed from main stems as they eventually become so tight as to sever the stem.

CONSTRUCTION WORK.

Walks, drives, and paved areas for various games are necessary elements in the school grounds. Fortunately we have reached the conclusion that things commonly used must be beautiful at least in form, and so we shall regard paths and drives as elements of decoration.

In most cases buildings are designed with one main entrance centrally located or two entrances symmetrically disposed. These should be approached by broad paved walks much wider than their use requires, as this is a well established concession to good appearance.

Greater use is made of the side or rear approaches set aside for the students. These should be wide enough, especially near the building,

where extra congregating space should be provided, to accommodate the excited outburst of pupils. Paths as wide as ten feet are found preferable to those of less width. While these paths should be direct, avoiding abrupt turns, curves of long radii will occasionally prove as practical as the more customary straight lines and one may in the use of a slightly curved path obviate the awkward cutting of open lawn spaces.

The materials of construction should be permanent, smooth and easily cleaned. Brick, concrete, and oiled macadam are advised, although the last should be reserved for rear paths, service drives, and congregating spaces.

The most beautiful material for walks is brick but it costs at least twice as much per unit as concrete. A great variety of patterns is made possible where bricks are used.

Added attraction may be given to concrete walks by scoring them in small squares in imitation of tiles. This is especially effective where red coloring matter is used. Lately there has been greater appreciation of uncolored cement. Too often the color of natural cement is made offensive by the addition of lamp black. Considerable doubt exists as to the necessity of using lamp black for the alleged purpose of diminishing the glare from the sun.

Oiled macadam paths should be provided with good curbs, especially where they border shrubbery beds. These curbs should be made of brick, concrete or two-inch redwood lumber. Of course, wooden curbs are cheaper in first cost but they require frequent painting and are apt to splinter under the constant shuffling of feet so are relatively short lived.

Brick will undoubtedly be admired as a path edging. The best construction is provided in laying common brick upon thick cement mortar as its base course, forming a strip eight inches wide, then a finish course of pressed brick is laid on top of this with ample cement "pointing" to form a coping four inches wide.

Concrete may be used as a coping and need not be more than four inches wide.

The service drive has become a more important adjunct to the high school grounds, giving access for automobiles, school busses, as well as delivery trucks for fuel, supplies, and groceries to the cafeteria. The drive should not be wide except in unusual cases where parking is allowed within the school grounds, when it should be eighteen to twenty feet wide. Ordinarily a drive ten to twelve feet wide will be ample.

The best oil macadam construction used in local street work is to be desired for the service drive. The macadam should be five or six inches in thickness and well crowned. Gutters may be fashioned in the macadam itself and three-inch redwood curbs provided although the regulation concrete curbs and gutters are to be preferred.

The oil macadam for paths need not be so thick (three to four inches will suffice).

Tennis, basketball, and other paved courts are ideally constructed of concrete. This will be found initially expensive but requires little upkeep.

Oil macadam is, however, a desirable material for such courts: it is easily mended and hollows may be readily filled by simply adding a

small amount of screenings and oil as depressions appear. In this respect, the oil macadam is superior to a surfacing of asphalt. When the latter material is laid with great precision, avoiding depressions, it is found to be a splendid court surface.

The open play spaces and minor paths remote from the buildings may be made of water bound macadam. This is constructed as the oil macadam except that water is sprayed between rolling of the various courses instead of oil. It is highly essential to provide the right proportions of quarter-inch screenings and rock dust to insure a surface that is resilient, with no large rock appearing in the surface to injure players, and so that too much dust does not remain to blow about the grounds.

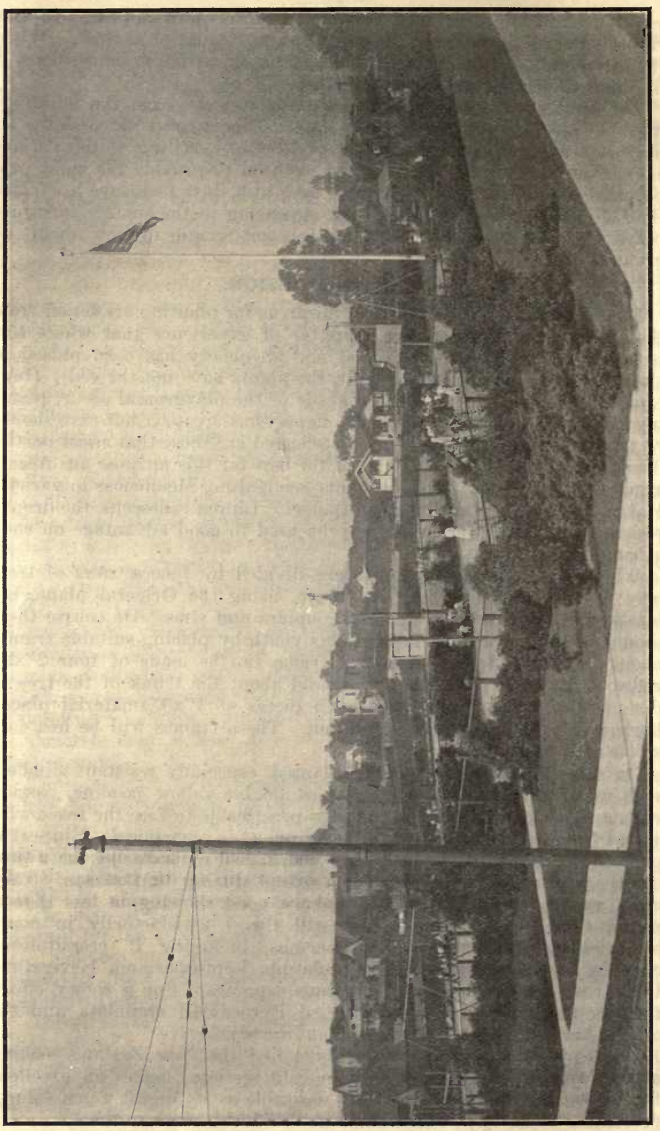
PLANTING DESIGN.

In a well planned school ground the areas for planting are set off from the play areas. It has been a matter of experience that where this precaution has not been observed and shrubbery has been placed in close relationship to the play fields, the plants have not thrived. However, where sharp changes in the grade of the playground occur, planting may well be introduced on the slopes thus created; but care should be taken that the varieties of plants selected are those that resist partial drouth and general wear. Some of the best for this purpose are Acacia armata, A. longifolia, Leptospermum laevigatum, Melaleucas in variety, Hakea suaveolens, and Coprosma Baueri. Lippia canescens, the drouth resistant substitute for grass, may be used to good advantage on such a bank.

Where the various play areas are divided by fences, rows of trees may be planted parallel to the fence, using the Oriental plane, the blackwood acacia and some of the poplars and elms. Of course these should be well protected during their youth by placing suitable frames about the young trees. A useful frame can be made of four 2″x2″ redwood stakes driven into the ground about the trunk of the tree at distances of a foot apart, and with pieces of 1″x3″ material placed horizontally to hold them in position. These frames will be less conspicuous if painted green.

On some fences, vines may be planted, especially resistant climbers such as the English ivy, honeysuckles, double yellow jasmine, passion vine, and banksia rose. At times it is practicable to face the fence with a neat hedge, for which the California privet is economical. Since it is partially deciduous and can be dug with naked roots during the winter months, the plants are reasonably priced during that season. They grow rapidly and small plants make a good showing in less than a year's time. Other hedges that will thrive satisfactorily in many localities are the various Pittosporums, including P. crassifolium, eugenioides, tenuifolium, and undulatum, Leptospermum laevigatum, Ligustrum japonicum, and Evonymus japonica. For a showy effect, the fire thorns, both the red berried Pyracantha crenulata and the orange berried P. coccinea var. Lalandii are effective.

The Coprosma Baueri, commonly called the New Zealand looking glass plant, although not hardy in cold sections, makes an excellent fence covering and is particularly desirable as its bright green foliage presents a clean appearance even in the dusty summer time.



The Border Plantation, Bella Vista Playground, Oakland.

Where a low, trimmed hedge will suffice, the Lonicera nitida, the evergreen bush honeysuckle, may be used. It grows rapidly and is partially drouth resistant. It can be kept very low and is a substitute for dwarf box.

Planting within the playground.

The average playground presents an appearance of bareness that can be ameliorated by the occasional planting of trees, chiefly deciduous, between courts where less strenuous games are played, avoiding the areas devoted to such games as football and baseball.

In hot climates, the playgrounds of the smaller children may be made into delightful wooded groves with the swings, slides, and see-saws under the trees. Mosswood Park in Oakland has such an arrangement. It is advisable that the trees purchased for such planting be as large as can be obtained with trunks as much as four inches in diameter so that they will be sturdy enough to withstand the hard conditions imposed upon them. The Oriental plane, Huntingdon elm, and Arizona ash are types of trees that may be used for this purpose.

Authorities on recreation have agreed that the school playground should be enclosed with a strong fence, which need not be ornate, since attractive planting should be placed between the fence and the street or property line. To allow for this planting, the fence may be set back a distance varying from four to twelve feet as local conditions may make necessary. A lesser width, while not so satisfactory, may under cramped conditions provide room for vines, which will do much to relieve the severity. Where only vines are used those recommended for use within the playground will serve with such additional ones as the Muehlenbeckia complexa or wire vine, the evergreen trumpet vine, the white jasmine (J. officinale), Pandorea australis, and Tecomaria capensis.

Where funds and area permit, a strip of grass should be provided between the shrubs and the sidewalk, and in the parking between the sidewalk and the street.

Owing to the trying conditions these plants must withstand, such as lack of water, lack of intensive cultivation, prevalence of dust and abrasion, the choice of plants must be limited to such sturdy varieties as those listed below.

Botanical Name	Common Name
Acacia armata	
Acacia longifolia	
Acacia verticillata	
Arbutus unedo	Strawberry Tree
Carpenteria californica	
Cistus ladaniferus var. maculatus	Spotted Rock Rose
Cistus salvifolius	
Coprosma Baueri	New Zealand Looking Glass Plant
Evonymus japonica	
Hakea suaveolens	
Leptospermum laevigatum	Australian Tea Tree
Ligustrum ovalifolium	California Privet
Lonicera nitida	Evergreen Bush Honeysuckle
Malvaviscus arboreus	Turk's Cap
Melaleuca armillaris	Bottle Brush
Melaleuca decussata	Bottle Brush
Melaleuca ericifolia	Bottle Brush

Botanical Name	Common Name
Melaleuca hypericifolia	Bottle Brush
Melaleuca nesophila	Bottle Brush
Myrtus communis	Common Myrtle
Photinia arbutifolia	Toyon
Pittosporum crassifolium	
Pittosporum eugeniodes	
Pittosporum tenuifolium	
Pittosporum undulatum	
Plumbago capensis	
Prunus ilicifolia var. integrifolia	Catalina Wild Cherry
Raphiolepis umbellata	
Viburnum tinus var. lucidum	Large Flowering Laurustinus
Viburnum tinus var. strictum	

Street trees.

There is no school ground, however desolate, that should be without the charm of fine trees bordering the street or roadway. These should be mainly deciduous, especially in the northern parts of the state where the winter months are cool and cloudy and little sunshine is shut off by their bare branches. Broad leaved evergreens may be more frequently planted in southern California but even here it is well to avoid them in connection with unpaved roads for they exclude the sunlight and prevent rapid drying after a rainfall. It will be an extremely exceptional case where coniferous evergreens can be used advantageously and then only where a very wide parking strip of lawn is provided, and the paving is of concrete or asphalt, eliminating dust.

Certain trees should be avoided on account of undesirable habits. The roots of many species enter sewer pipes and often completely close them. In this class are many of the eucalypts, the poplars, willows, and some acacias.

Others are undesirable because continuous care is required to prevent the ground underneath from being untidy due to dropping leaves, branches, bark, gum, resin, fruits, and nuts. Among these are the black walnut, the eucalyptus, the mulberry, the umbrella tree, and the box elder.

Even in the southern part of the state, palm trees are not desirable as street trees for school grounds. Shade is not provided quickly enough and there is a tendency to plant them too thickly.

Much trouble can be avoided by providing ample room for the growth of trees. They should be spaced forty to eighty feet apart and never closer than twenty-five feet, depending upon the eventual size of the sort that is planted. The parking space should be wide, six feet between curb and sidewalk being a practical distance. On new street work the custom of placing the cement sidewalk next to the property line and throwing the balance of the sidewalk area into a parking strip of good width is becoming more prevalent. A frequent cause of annoyance and expense is the lifting of cement sidewalks by the roots of old trees due to narrow parking space. Often this can be avoided where drainage is good by planting the young trees in depressions and gradually filling the soil in as the trees grow, ensuring a deeper rooting habit. Especial care should be taken in planting to provide enriched soil and large holes. Where space is unavoidably restricted, the choice of smaller trees is advised, such as the hawthorn, the privet, various Pittosporums, the Carolina cherry, and the slow growing camphor.

Given ample space, the first choice is given the Oriental plane or European sycamore (Platanus orientalis). It is suited to all parts of the state, withstanding heat and drouth. It is rapid in growth and is long lived as well, and with little care develops an ideally branched head with many small branches in a highly ramified system.

The native or Oregon maple succeeds well and forms a beautiful specimen if great care is taken in the early pruning to start with a large number of main branches.

The Arizona ash thrives everywhere and the tulip tree is very satisfactory and especially interesting when in flower.

Other desirable trees for street purposes are the Island ironwood, the pink and white flowering locusts, the turpentine tree, Acacia melanoxylon, and two species of Eucalyptus, E. amygdalina var. augustifolia and E. polyanthemos.

Planting in front of the building.

It is in the area in front of the building that the chief opportunity for really decorative planting lies. It has been noted in the playground and border plantations that the choice of material is limited by growing conditions. The front parking, however, may be well protected and it is advisable in order to insure this to continue the boundary fence to which allusion has already been made, returning it (with a right angle turn) toward the building so as to form a junction at the rear corner of the building. For the sake of simplicity and to provide a foreground for the picture produced by the combination of architecture and base planting, ample width of lawn should be provided. This lawn should extend from the shrubbery at the base of the building to the street sidewalk.

Open lawn center.

Keep the lawn center free from any planting whatsoever except in hot climates where occasional shade trees may be necessary. These, however, may be placed so as not to destroy the unity of the lawn.

"Keep the lawn center open" is an axiom of landscape gardening. Although this fact has often been reiterated, the observance is that the amateur still scatters specimen trees and shrubs as well as flower beds wherever there is an open place thus destroying the charm of grassy expanse. To carry out this rule, much tact and watchfulness will be required on the part of the authorities since occasions often arise where class or other memorial trees are given and enthusiastic but ill-advised persons will suggest a fine open space for the location of the tree with its welfare solely in mind.

At the junction of walks, low shrubs should be placed. These form a soft transition between the lines of diverging walks and serve to protect the lawn from the wear that is caused by the natural tendency to cut corners. For facing the walks at these points, we have some excellent material. The red berried Cotoneaster microphylla and the creeping juniper, both of which are hardy throughout the state, are examples of the type desired. Where a larger group is wanted, more height may be introduced further from the walk with the lower shrubs used for facing and here Pyracantha crenulata and P. coccinea var. Lalandii, Myrtus communis, and M. communis var. microphylla, Coprosma Baueri, Cotoneaster Franchetii, Pittosporum Tobira, and Raphiolepis umbellata prove desirable.

Without planting, the school building presents a stiff, isolated appearance. It is the role of planting, especially that at the base of the building, to soften the austerity of architecture and, to a degree, fuse the lines of the building with those of the surrounding landscape.

As in the architecture of the building so also in the planting, the chief point of interest and elaboration should be at the main entrance to the building. This can be obtained by using groups of plants of strong vertical emphasis such as the Italian cypress, Irish yew, Irish juniper, or incense cedar. These may be properly balanced at either side of the entrance and so placed as to repeat at close proximity the strong verticalities of the building.

One pleasing arrangement of these accent specimens is made by placing them in groups of threes, the individual sizes of the trees in each group varying. It is really better that these emerge from a mass of softer foliage. Likewise attention can be focused on the planting near the main entrance by introducing plants of bold leaf texture such as Fatsia japonica, F. papyrifera, and Coprosma Baueri in warmer climates, and the Acanthus and the English laurel.

The remainder of the planting should be of less emphatic nature both as to verticality and boldness of texture save at minor points of interest where a treatment similar to that of the main entrance should be made, taking care that it be of lesser importance so as not to rival the main entrance in interest.

Too much stress can not be placed upon the necessity for soft, harmonious planting throughout the main portion of the mass. In California, especially, we must give this much consideration since we have such great variety of plant materials from which to choose. The result of amateur effort is often the planting of individually attractive shrubs in groups, regardless of harmony and unity of effect. There is too much accent, too many plants of insistent claim to attention. This comes from the practice of taking the usual junketing trips to a nursery and selecting pleasing specimens, usually one or two of a kind, attempting to make a harmonious group of them. To overcome this, the need of a plan becomes evident. In general, in grouping plants, it is well to follow the rule that plants with leaves of a similar size and shape be grouped together thus producing harmony of texture. Transition from finely textured to coarser leaved plants should be gradual. An example of such a transitional series is from the finest, as the heather or breath of heaven, graduating upward to the Berberis stenophylla, Lonicera nitida, Myrtus c. microphylla, Myrtus communis, Eugenia myrtifolia, laurustinus to English laurel.

It is a safe procedure to select a majority of plants that have soft outline, giving a graceful effect. Typical of these are the Australian tea tree, Abelia grandiflora, Cotoneaster Franchetii, C. pannosa, Melaleuca hypericifolia, Plumbago capensis, and the Italian yellow jasmine.

In grouping plants against the building, it will be well to bear in mind the classification which the practical landscape designer makes of all plants. The taller shrubs are classified as background shrubs, the medium as fillers, and the low growing, attractive shrubs whose branches touch the ground, as facers. Of course the line of demarcation can not be rigidly drawn because it is sometimes advisable to bring

larger growth to the front of the planting but in the selection of such specimens choice must be given to those that naturally "face" themselves.

Much need for tall material is found where blank walls made necessary by the present system of unilateral lighting for classrooms leave a severe expanse of masonry. Unless the construction is of cement plaster on a wooden frame, vines such as the Boston ivy may be used to give relief and add charm. Tall shrubs may be arranged against such a wall to give a pleasing silhouette. In placing the background or taller shrubs against the building care should be taken to avoid overplanting. Windows and light wells must not be covered. The blank wall spaces between windows, however, will require tall planting.

There are suggested below under separate headings, lists of shrubs which may be considered as background material, fillers, and facers. It is obvious that the scale of planting groups will differ and shrubs listed as fillers may, in a larger scale group, be considered as facers. With this in mind some overlapping between the various lists has seemed necessary.

Background Shrubs.

Botanical Name	Common Name
Acacia longifolia	
Arbutus unedo	Strawberry Tree
Ceanothus thyrsiflorus	California Wild Lilac
Cornus capitata	Evergreen Dogwood
Eleagnus pungens	
Eriobotrya japonica	Loquat
Escallonia montevidensis	
Escallonia pulverulenta	
Escallonia rosea	
Eugenia Hookeriana	
Eugenia myrtifolia	
Hakea suaveolens	
Laurus nobilis	Bay Tree
Leptospermum laevigatum	Australian Tea Tree
Ligustrum lucidum	Privet
Maytenus Boaria	Mayten Tree
Pittosporum crassifolium	
Pittosporum eugenioides	
Pittosporum rhombifolium	
Pittosporum tenuifolium	
Pittosporum undulatum (tender)	
Photinia arbutifolia	Toyon
Photinia serrulata	
Prunus caroliniana	Carolina Cherry
Prunus ilicifolia	California Evergreen Cherry
Prunus ilicifolia var. integrifolia	Catalina Cherry
Prunus laurocerasus	English Laurel
Rhamnus californica	California Wild Coffee
Viburnum tinus var. lucidum	Large Flowering Laurustinus

There are many shrubs that are valuable for their color but make such straggling growth that they must also be placed at the rear of other shrubs. Among these are the butterfly bush, Callistemon, Cestrum, the mock orange, oleander, and Spanish broom.

Fillers.

Botanical Name	Common Name
Abelia grandiflora	
Arbutus unedo	Strawberry Tree
Berberis Thunbergii	Japanese Barberry
Buddleia globosa	
Buxus japonica	Box
Carpenteria californica	
Chaenomeles japonica	Japanese Flowering Quince
Coronilla glauca	
Coronilla emerus	
Coprosma Baueri	New Zealand Looking Glass Plant
Cotoneaster Franchetii	
Cotoneaster pannosa	
Cytisus multiflorus	Portugal Broom
Diervilla florida	Weigela
Escallonia montevidensis	
Escallonia rubra	
Eugenia apiculata (Myrtus luma)	Luma
Evonymus japonica	
Leptospermum laevigatum	Australian Tea Tree
Ligustrum sinense	Chinese Privet
Melaleuca hypericifolia	Bottle Brush
Myrtus communis	Common Myrtle
Plumbago capensis	
Prunus ilicifolia	California Evergreen Cherry
Prunus lusitanica	Portugal Laurel
Pyracantha angustifolia	Fire Thorn
Pyracantha crenulata	Fire Thorn
Pyracantha coccinea var. Lalandii	Fire Thorn
Swainsonia g. albiflora	
Viburnum tinus	Common Laurustinus
Viburnum tinus var. lucidum	Large Flowering Laurustinus

Facers.

Abelia grandiflora	
Berberis Darwinii	Darwin's Barberry
Berberis stenophylla	
Berberis Wilsonae	
Buxus s. suffruticosa	Dwarf Box
Choisya ternata	Mexican Orange
Cistus ladaniferus var. maculatus	Spotted Rock Rose
Cistus laurifolius	Rock Rose
Cistus salvifolius	Rock Rose
Coprosma Baueri	New Zealand Looking Glass Plant
Cotoneaster horizontalis	
Cotoneaster microphylla	
Diosma ericoides	Breath of Heaven
Escallonia rubra	
Evonymus j. viridi-variegata	
Grevillea Thelemanniana	
Hypericum Moserianum	
Lonicera nitida	Evergreen Bush Honeysuckle
Mahonia pinnata	
Mahonia aquifolium	Oregon Grape
Pimelea ferruginea	
Pittosporum Tobira	
Polygala Dalmaisiana	
Pyracantha crenulata	Fire Thorn
Pyracantha crenulata var. Yunnanensis	Fire Thorn
Raphiolepis umbellata	
Sollya heterophylla	Australian Blue Bell
Trachelospermum jasminoides	
Veronica buxifolia	
Veronica elliptica	
Veronica Traversii	

Color.

Most of the color in the school grounds may be secured from flowering vines, shrubs and trees, of which we have great numbers. The perennials and annuals, while giving a splendid array of color, require constant care and replacing and are not satisfactory for the school ground where the gardener usually has little time for such intensive work. In the smaller schools, too, the gardening generally devolves upon the janitor, and this added duty should be made as simple as possible.

A few annuals and perennials give an intimate charm but those selected should be easy of culture such as the pentstemons, the purple sage (Salvia leucantha), hollyhocks, foxgloves, Japanese anemones, heuchera, and saxifrage. Hardy annuals are petunias, verbenas, nasturtiums, Cape marigolds, and pansies.

Seasonal color effects.

In California there may always be color in the garden regardless of season. It is not essential to plan for color display during the summer months when the schools are not in session. Yet frequently the school grounds are brighter with flowers at that season than at any other.

During the fall and winter months, by judicious planning, there may be a constant succession of bright color derived from the berried shrubs, beginning with Pyracantha crenulata, P. coccinea var. Lalandii, and the mountain ash, followed by Cotoneaster Franchetii in salmon red, and Cotoneaster pannosa in deeper red, then the toyon, and extending the season into spring, Pyracantha angustifolia. All of these are hardy throughout the state and bear an abundance of berries. The various heathers enliven these months with a succession of delicate blossoms. The Spanish broom is indefatigable, and the dwarf variety of the species may also be counted upon for several distinct crops during the year. Coronilla glauca, Plumbago capensis, and Tecomaria capensis, too, add cheerful color during these months.

Perennials for fall and winter are the pentstemons, Japanese anemones, saxifrage, and Iris unguicularis.

Spring effects are easily obtained, there being almost unlimited material. Deciduous shrubs, which must form the principal display in the eastern states, should be used sparingly in California gardens. However, there are certain deciduous shrubs and trees that are wonderfully charming during their blossoming period and symbolize effectively the return of spring. Even these should be used in moderation since their bare branches and inferior foliage are not especially desirable. The best practice is to place them back of other shrubs so that their glorious display of color will tower above the setting of evergreen foliage.

The loveliest of these are the flowering fruits, including the double flowering peaches, the crab apples, the old-fashioned lilacs, the weigelas, the hawthorns, especially Paul's double scarlet hawthorn, and Spirea Cantoniensis which is practically an evergreen.

In the base planting, it is well to choose colors that are effective against the background of the building. A common error is to plant too many white-flowered varieties and gray-leaved shrubs against walls of whitish cement plaster. This is extremely uninteresting. It is

better to reserve these for use against a background of brick while the bright color effects show to fine advantage against walls of gray and white.

In the matter of color schemes, first avoid the discord that comes from grouping together the two hues of the same basic prime color which differ from each other in that one contains a "modifier" of one of the other two prime colors while the hue which clashes with it contains a modifier of the remaining prime color. This is most noticeable in the combination of various hues of red, scarlet and magenta which often prove very unpleasing when grouped together.

It is sometimes difficult to secure a pleasing combination of colors of varying intensity as is the case when a strong color is used with its dilute derivative. Here again, red is the most difficult to manage, so it will be well for the amateur to avoid red and pink in close proximity. Blues and yellows seem to blend with their lighter shades in a less offensive manner.

Solid masses of one color are always safe unless carried too far, but the effect is not necessarily monotonous when it is considered that the green of the foliage and the gray or brown of the wall enters into the color composition.

Each main color is enhanced by a lesser amount of its complementary hue with often a very slight amount of some distinct hue which the taste of the planter may determine upon as adding a certain sprightliness to the arrangement. An indication of what is meant can be conveyed by such a group as this; a large fleecy mass of sky blue plumbago, a dozen treated as shrubs, with perhaps three Cestrum aurantiacum in its dull orange tones complementary to the plumbago, with the touch of piquancy added by the flowers of the Irish Elegance rose.

CARE OF SCHOOL GARDENS.

After the first phase of laying out the grounds has been completed, only vigilant care will be rewarded by vigorous growth. During the first year the young shrubs and trees are establishing themselves and nothing should be allowed to check their growth. In fact the observation has been made that once stunted by neglect in their early stages, ornamental trees and shrubs seldom develop satisfactorily.

Water applied in copious amounts during the first dry season will prove an ultimate economy. It should be administered at intervals varying with the temperature, applying much at a time rather than a little every day. This will result in deep rooting, an insurance against future neglect.

After every irrigation, it is of great benefit to cultivate the planted areas exclusive of lawns. This fact is little appreciated by those unskilled in gardening under our local conditions. There is a period after every irrigation, seldom over a few hours in duration, when the soil is in the right condition to be cultivated. Before this time the ground is of course too wet, and after that, the crust will have formed and much of the value of the whole irrigation will have been lost. Capillarity exists at all times in the soil and water brought to the surface escapes directly into the air through the soil crust. The dust mulch is essential to prevent this condition. It can be maintained by simply scratching the surface of the soil not deeper than an inch or

two at the "psychological moment" after watering. A short rake or broken piece of one, or a special garden hand cultivator will be best for this work. Deep spading is far more costly and injures the root systems.

During the first season's growth a knowledge of the habits of the grown specimens will prove a reliable guide for certain little attentions which can be given to the young shrubs. Thumb nail pruning is very beneficial and saves future work with the saw and wheelbarrow. In order to insure the thick, bushy growth so essential here where the bare ground must be covered at all seasons, the early removal of the terminal buds from the main branches is advised for such shrubs as varieties of Acacia, Berberis, Callistemon, Coronilla, Ceanothus, Coprosma, Diosma, Escallonia, Evonymus, Jasminum, Leptospermum, Ligustrum, Melaleuca, Myrtus, Plumbago, and Pyracantha. This sort of pruning while beneficial for most shrubs should be avoided in certain plants whose chief charm lies in their long, graceful branches or trunks. For these a mere thinning or no pruning at all is advisable. In this class are the birch trees, bamboos, Cotoneaster Franchetii and C. pannosa, Azara, Eugenia myrtifolia and E. Hookeriana. The same treatment should be accorded any shrub whose function in the planting design is that of breaking the skyline or silhouette of a group.

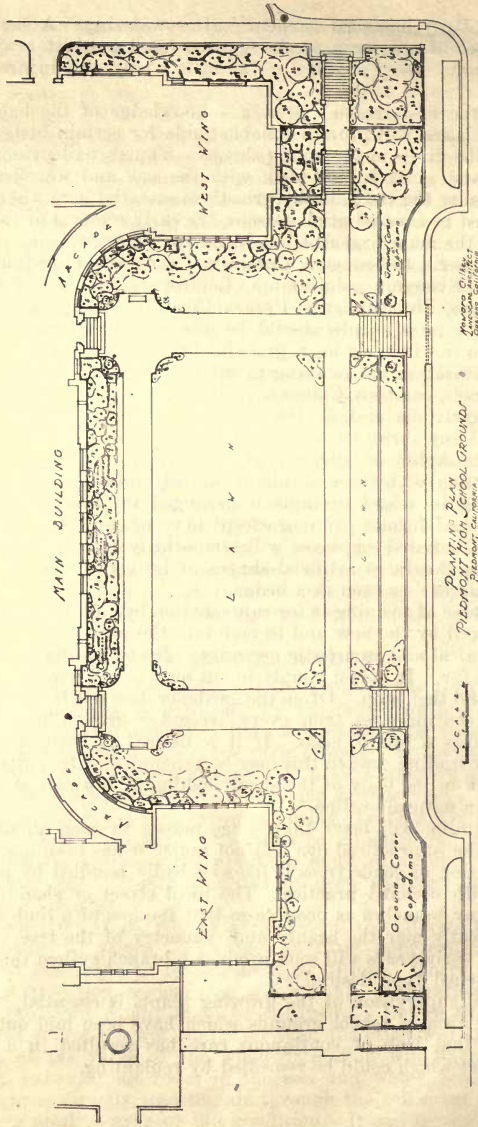
The pruning of mature shrubs is wofully misunderstood. Most of the planting in school grounds is arranged informally so that little need be said of formal pruning except to caution against it altogether. Often an ill advised employee will temporarily ruin the shrubbery by clipping the shrubs in artificial shapes or by giving the whole mass a "Dutch haircut" as even as a hedge.

The purpose of pruning is for rejuvenation by cutting out old growth to be replaced by the new and to maintain the proper skyline and it is both a practical and an artistic necessity. Most pruning operations are carried too far. It is best simply to cut out the old wood and interfering limbs and then stop. Often the gardener does not leave well enough alone but continues to trim every irregular growth back until the shrub becomes a lumpy mass. If it is desired to limit the length of a branch or leading growth this may be accomplished by cutting out the growth back in the body of the shrub making as few cuts as possible so as to leave a natural outline.

Good pruning will leave the foliage masses in such an undespoiled state that the unpracticed eye will not notice it has been done.

The pruning of shade trees is likewise badly handled by persons too familiar with orchard practice. The ideal street or shade tree must have as many branches as possible so that the loss of a limb in a storm will not greatly mar the beauty and symmetry of the tree. Frequent pruning in early years will soon produce a branch system that is of the finely branched type desired.

Continual supervision of the growing plants is essential. The most serious criticism of school grounds which have been laid out and well planted is that lack of continuous care has resulted in a generally ragged effect which could be remedied by replanting.


MAIN BUILDING
ARCADE
WEST WING
EAST WING
LAWN
Ground Cover Cotoneaster
PLANTING PLAN
PIEDMONT HIGH SCHOOL GROUNDS
PIEDMONT, CALIFORNIA
SCALE

SECTION ONE—PLANTING PLANS.

KEY TO PLANTING PLAN PIEDMONT HIGH SCHOOL.

No.	Qy.	Botanical name	Common name
1	8	Taxus baccata fastigiata	Irish Yew.
2	11	Juniperus c. procumbens	Creeping Juniper.
3	9	Rhododendron obtusum var. hinodigiri	Japanese Azalea.
4	55	Cotoneaster microphylla	
5	12	Pyracantha crenulata	Fire Thorn (scarlet berried).
6	8	Eugenia myrtifolia	
7	26	Abelia grandiflora	
8	5	Sollya heterophylla	Australian Blue Bell.
9	2	Camellia japonica	Pink Camellia.
10	1	Pyrus micromalus var. Kaido	Flowering Crab Apple.
11	17	Lonicera nitida	Evergreen Bush Honeysuckle.
12	7	Pimelea ferruginea	
13	5	Trachelospermum jasminoides	Star Jasmine.
14	4	Hydrangea opuloides	Pink Hydrangea.
15	4	Rhododendron ("Pink Pearl")	Pink Pearl Rhododendron.
16	2	Veronica hulkeana	
17	6	Azara microphylla	
18	10	Viburnum tinus lucidum	Large Flowering Laurustinus.
19	4	Cestrum aurantiacum	
20	6	Plumbago capensis	Blue Plumbago.
21	4	Rosa sp.	Rose "Irish Elegance."
22	32	Cotoneaster franchetii	
23	6	Chaenomeles japonica	Japanese Quince.
24	2	Escallonia langleyensis	
25	3	Maytenus boaria	Mayten Tree.
26	2	Escallonia rubra	
27	5	Erica melanthera	Heather.
28	5	Erica persoluta alba	Heather.
29	5	Eugenia hookeriana	
30	14	Mahonia aquifolium	Oregon Grape.
31	9	Cotoneaster pannosa	
32	13	Cedrus deodara	Indian Cedar.
33	3	Berberis stenophylla	Barberry.
34	11	Coprosma baueri	New Zealand Looking Glass Plant.
35	2	Coprosma baueri var. variegata	
36	3	Ceanothus thyrsiflorus	California Wild Lilac.
37	23	Leptospermum laevigatum	Australian Tea Tree.
38	1	Pyracantha angustifolia	Fire Thorn (orange berried).
39	3	Escallonia montevidensis	
40	14	Photinia arbutifolia	Toyon.
41	3	Escallonia pulverulenta	
42	3	Prunus illicifolia	California Evergreen Cherry.
43	8	Berberis californica	
44	3	Cytisus multiflorus	Portugal Broom.
45	2	Pittosporum eugenioides	
46	4	Myrtus ugni	
47	4	Pyracantha crenulata var. yunnanensis	
48	3	Diervilla florida	Pink Weigela.
49	1	Leptospermum scoparium var. nicholii	
50	1	Escallonia montevidensis	
51	3	Ligustrum sinense	Chinese Privet.
52	1	Eleagnus pungens	

PLANT MATERIALS.

In the foregoing pages mention has been made of a wide variety of trees, shrubs, vines, and perennials suitable for various purposes and capable of producing certain effects. With the thought that a limited list, alphabetically arranged, of plant materials suitable for school grounds would prove helpful, the following lists have been prepared. Mainly plants of proved sturdiness have been chosen and no pretense to completeness is assumed, nor have all plants suitable for school grounds been included. In a state as great in extent as California it would be impossible to prepare lists containing all plants known to thrive in all parts of the state. Generalization is extremely difficult. Likewise it is hoped that these lists will not be accepted "in toto" but will merely be used as first aids to those in charge of planting developments.

The nomenclature is that of the Standard Cyclopedia of Horticulture edited by L. H. Bailey. Common names have been given where they are widely known but it has not been felt that useless common names from other countries should be encouraged, viz., many of the acacias are called "wattles" in Australia where they are native, but here we have learned to love the sound of their more euphonious botanical name. Where so many of our best plants are introduced from other countries and some of them rather recently, no common names exist and short expressive names would be relished as substitutes for the botanical names, many of which are difficult of pronunciation.

Certain general conditions govern the selection of plants to be used in school grounds.

1. The trees and shrubs that are indigenous, or those introduced species that are allied to them and resemble them and succeed as well as native varieties should be preferred to exotic varieties that are associated with other sections. Local pride should be fostered in the child so that he will gladly learn the names of native plants.

2. Plants with simple green leaves and natural habit of growth are to be preferred to variegated specimens, weeping and distorted individuals, and freaks of nature. Where the choice of plants is left to the nurseryman of the old school, the selection is largely of these sorts. Gray foliage is especially inimical to desirable results in our warmer sections where they call to mind the gray, dusty foliage of the desert.

3. The proportion of evergreen flowering shrubs and trees in most cases should exceed that of deciduous materials and herbaceous perennials.

4. Certain plants are found to be disturbing elements in the peaceful and harmonious arrangement of our foliage and color masses due to their striking texture or color. In this class are palms, dracaenas, monkey puzzles, bananas, cannas, red geraniums, and bougainvilleas. All of these can be used with effectiveness, but it is so seldom done that caution is advised.

5. Shrubs should be so massed together and so pruned and cared for that they will merge together. Single specimens on the lawn are to be sparingly introduced and not to provide the major part of the planting. Many of one species should be used in the masses, taking care, however, to avoid lumpy isolation of each species by cunningly interspacing with adjoining varieties.

6. In our climate where snow rarely falls and hides the bare earth throughout the winter months, the harshness of appearance which too much cultivated ground gives should be avoided by carefully facing down with shrubs that grow neatly, compactly, close to the ground, and are evergreen.

APPENDIX.

Alphabetical Lists of Plant Materials.

NOTE.—The figures immediately following the name indicate the height (in feet) of the species, not the extreme height but an average one or the most practical height to maintain under ordinary care and pruning.

BROAD LEAVED TREES.

Deciduous and Evergreen.

ACACIA MELANOXYLON (60), the blackwood Acacia, is a very useful tall tree, pyramidal in youth but widespreading when mature. It resembles the native bay. A. Baileyana (30), has showy blossoms appearing in midwinter and contrasting with feathery frondlike masses of silvery gray foliage.

ACER MACROPHYLLUM (100), our native maple, is a valuable wide spreading tree requiring ample room.

AESCULUS CALIFORNICA (30), the California buckeye, is a native tree of much symmetry and with a broad, spreading head. It has panicles of white flowers. A. Hippocastanum (50), the European horse chestnut, is a strong growing tree with flowers tinged with pink. A. carnea (40), the red flowering horse chestnut, is an especially attractive tree when in blossom.

ARBUTUS MENZIESII (50), the madrone, is a native that should not be omitted when it is possible to procure it in nursery grown stock.

BETULA PENDULA, the white birch, and its cut leaved variety, B. p. var. laciniata, appear well disposed in almost any situation provided that ample water and wind protection is assured.

CINNAMOMUM CAMPHORA (50), the camphor tree, has light green foliage strongly scented with camphor. It is symmetical in shape and slow growing.

CITRUS SINENSIS, the sweet orange, should not be overlooked as landscape material.

CRATAEGUS OXYACANTHA var. PAULII, Paul's double scarlet hawthorn, and other varieties of the hawthorn are free blooming in the springtime.

EUCALYPTUS—The gum trees, while useful as windbreaks, should not be planted near buildings and in the playground. When used, choice should be given to the graceful E. viminalis, E. amygdalina var. angustifolia (E. linearis) whose narrow, graceful foliage gives it much beauty, E. polyanthemos, and E. leucoxylon var. rosea, the pink flowering eucalyptus. Where hardy the E. ficifolia or scarlet flowering gum which is slow growing and dwarf in habit proves desirable for landscape use. It has large, handsome flowers in shades of red.

FAGUS SYLVATICA var. PURPUREA (25), the purple leaved beech, is one of our best purple leaved trees. It grows compactly and is an attractive lawn specimen.

FRAXINUS VELUTINA (100), the Arizona ash, has a straight trunk and shapely head. Drouth resistant.

GREVILLEA ROBUSTA (80), the silk oak, is a valuable tree for semi-arid regions.

LIRIODENDRON TULIPIFERA (100), the tulip tree, is an interesting tree of stately habit with rich green leaves and cup shaped flowers, resembling the tulip, in greenish yellow.

LYONOTHAMNUS FLORIBUNDUS var. ASPLENIFOLIUS (75), the Island ironwood, is a native of the islands off the southern coast of California. Its erect growth, graceful habit, and interesting leaflets give it landscape value.

MAGNOLIA GRANDIFLORA is commonly known. It has large, thick leaves and great waxlike flowers of wonderful fragrance.

OLEA EUROPAEA, the olive, is drouth resistant and when allowed to develop naturally becomes very graceful.

PLATANUS ORIENTALIS (80), the Oriental plane, is one of our best street trees, being shapely, of clean habit, and with an exceptionally fine branching habit.

POPULUS NIGRA var. ITALICA (100), the Lombardy poplar, is a useful tree of columnar shape which effectively breaks the skyline of a planting group. The poplars grow very rapidly. They are very attractive in the autumn when the leaves about to fall become rich yellow in color. Both P. deltoides var. caroliniensis, the Carolina poplar, and P. alba var. pyramidalis, Bolle's poplar, are similar in habit to the Lombardy poplar.

PRUNUS—This genus includes the almonds and the plums which may be secured in many charming varieties.

QUERCUS AGRIFOLIA and Q. chrysolepis are native live oaks, and grow quite rapidly. Q. suber, the cork oak, thrives under adverse conditions. The deciduous native oaks, Q. Douglasiana and Q. lobata are preferable to species from Eastern U. S.

ROBINIA PSEUDACACIA, the common locust, grows rapidly, has a graceful appearance when in leaf, and bears many clusters of white flowers, notably fragrant. R. p. var. Decaisneana, the pink flowering locust, is a vigorous tree producing an abundance of pink flowers.

SCHINUS MOLLE (40), the California pepper tree, has drooping branches with graceful, pinnate leaves. Its flowers, which are inconspicuous, are followed by long clusters of red berries.

TRISTANIA CONFERTA (100), the Brisbane box, is a drouth resistant tree of good appearance.

ULMUS CAMPESTRIS (100), the English elm, may be used for park clumps or for street planting. The elms are hardy, sturdy trees thriving under adverse conditions. U. parvifolia, the Chinese elm, is almost an evergreen. U. hollandica var. vegeta, the Huntingdon elm, is a much used street tree.

UMBELLULARIA CALIFORNICA, the California laurel or bay, is a native with aromatic leaves of deep green.

CONIFERS.

ABIES CONCOLOR (150), the silver fir, has ashy gray foliage borne in frond-like sprays arranged in tiers. Its bark is almost white and the tree is resistant to heat and drouth. A. Nordmanniana (100), Nordman's silver fir, is majestic but grows slowly. A. Pinsapo (70), the Spanish fir, is very regular in habit and is well adapted to warm climates. All are of conical outline and markedly symmetrical.

ARAUCARIA BIDWILLII (100), is a handsome tree of symmetrical habit and should always be planted as a solitary specimen, ample room being given to allow its development. A. imbricata (100), the monkey puzzle, should never be planted except in a botanical garden where it will have value as a curious tree.

CEDRUS DEODORA (100), the Indian cedar, is a magnificient pyramidal tree with graceful, drooping, plume-like branches. It is one of our loveliest conifers and succeeds universally. C. atlantica var. glauca (100), the blue Mount Atlas cedar, has glaucous or silvery leaves and although straggling in appearance when young, it becomes compact and symmetrical at maturity. C. libani (90), the cedar of Lebanon, is a noble tree of wide spreading habit.

CHAMAECYPARIS LAWSONIANA (100), the Lawson cypress, is a beautiful tree with drooping branches and makes an excellent lawn specimen. It is a native.

CUPRESSUS SEMPERVIRENS var. FASTIGIATA (70), the Italian cypress, is one of a genus of tall, slender trees with erect habit of growth. It is especially useful for accenting points of architectural emphasis, or for vertical accent in a group of planting.

JUNIPERUS VIRGINIANA is of erect almost fastigiate habit.

LIBOCEDRUS DECURRENS (100), the incense cedar, is a native of stately columnar growth that may be used, often, in place of an Italian cypress.

PINUS has many species of which the most adaptable are P. canariensis (75), which has plumy sprays of needles often a foot in length, P. pinea (75), the Italian stone pine, P. radiata (100), the Monterey pine, P. nigra var. austriaca (100), which is almost a black green, P. Parryana (30), and P. halepensis which resists great heat and drouth.

SEQUOIA is our native genus which is remarkable for both size and beauty. S. sempervirens (300), our redwood, is especially handsome and should be used in groups or as specimen trees. S. gigantea (300), the California big tree, has a stately trunk thickly furnished with branches, makes a fairly rapid growth, and is very long lived so that the ancient trees of our Sierras attain gigantic size.

TAXUS BACCATA (40), the English yew, makes a good hedge or informal screen. T. b. var. fastigiata (30), the Irish yew, is one of our best specimen trees, its erect, slender growth making it valuable for accent purposes.

SHRUBS.

ABELIA GRANDIFLORA (5), is a flowering shrub with leaves tipped with bronze in their early growth. Its flowers are tubular, white flushed with pink. It has a graceful drooping habit and is useful both as facing and filling material.

ACACIA—This genus comprises many species of widely divergent types. Most of those used for shrub effects should have their terminal growths removed during their youth so as to induce side branching and a thicker growth at the ground. All bear an abundance of blossoms in shades of yellow and are resistant to heat and drouth. A. armata (8), A. verticillata (10), and A. longifolia (15–20) are useful for covering steep banks. A. longifolia is also effective when clipped into formal shapes to be used in tubs at entrances to buildings or in formal gardens. A. cultriformis (10) and A. Baileyana (30) have grayish foliage and showy blossoms, both being useful as accent shrubs in a group of plain foliage. A. retinodes (20) is quick growing with slender, light green leaves and as it blooms intermittently throughout the year, it becomes valuable for the color it lends.

ADENOSTEMA FASCICULATUM (4) is a native shrub of heather-like habit.

ARBUTUS UNEDO (8), the strawberry tree, resembles our native toyon very closely but has large fruits resembling strawberries. Its flowers are like those of our madrone.

AZARA MICROPHYLLA (12) is a decidedly graceful shrub with erect habit of growth. Its small glossy, green leaves have a frond-like arrangement on slender branches. It should be placed at the rear of the plantation where it will gracefully break the skyline of the group.

BAMBOOS may be used where a tropical effect is desired. Some useful and desirable species are Arundinaria japonica (10), Bambusa fastuosa (15), Phyllostachys Quilioi (40), and P. Henonis (20).

BERBERIS—This is a genus of hardy, flowering shrubs. B. Darwinii (3) has holly-like glossy leaves and bears an abundance of soft orange flowers in winter, which are followed by purple fruits. B. stenophylla (1-3) has a similar flower effect but its stems are drooping in habit. Its leaves are narrow and silvery underneath. B. Thunbergii (3), the Japanese barberry, is deciduous, its leaves becoming crimson in autumn before dropping. B. Wilsonae, the prostrate variety, bears yellow flowers and red berries.

BUDDLEIA DAVIDII (10), the butterfly bush, is a large shrub of rapid growth, bearing long clusters of lilac blossoms marked with yellow. It should be placed to the rear of the plantation. B. globosa (8) is a more compact shrub, bearing globular flower heads of golden yellow.

BUXUS SEMPERVIRENS (8-12), the familiar box, may be used for hedges or trained to standards, pyramids, or globes. B. sempervirens var. suffruticosa, the dwarf box, is used for low, formal edgings.

CALLISTEMON LANCEOLATUS (10) is a bottle brush bearing brilliant spikes of scarlet that resemble bottle cleaners in form. It should be used in the rear of the plant group since it has an ungainly habit and its charm lies in its striking blossoms. It is resistant to drouth.

CARPENTERIA CALIFORNICA (8) is a native of our state, its foliage resembling that of the oleander. It bears large, fragrant, white flowers with yellow centers which are similar to the flowers of the mock orange.

CEANOTHUS—We have numerous species of the native mountain lilac which are adaptable to use in our gardens. They are drouth resistant, grow rapidly, and bear great clusters of blossoms either in white, blue, or pink. Probably the most useful is Ceanothus thyrsiflorus (10), which has light blue flowers.

CESTRUM AURANTIACUM (10) is a strong growing shrub bearing tubular, dull orange colored blossoms which are followed by white berries. It combines wonderfully well with various shades of blue but should be well faced. C. elegans has a similar habit but its blossoms are crimson. Both are tender.

CHAENOMELES JAPONICA (8), the Japanese quince, gives a striking spring effect and may be used in any part of the state. The scarlet forms are especially bright, but the pink and white varieties are also attractive.

CHOISYA TERNATA (6), the Mexican orange, is a low growing, compact shrub with glossy, bright green leaves. It bears great clusters of white blossoms.

CISTUS—This genus provides many useful, low shrubs bearing blossoms similar to single wild roses. All of them are fairly drouth resistant. C. landaniferus var. maculatus, the spotted rock rose, has large white flowers with conspicuous dark spots. C. laurifolius (4) and C. salvifolius (2) are also desirable varieties.

COPROSMA BAUERI, the New Zealand looking glass plant, an excellent shrub with glossy green foliage, may be used to cover banks, as a hedge, a tall shrub, or as a low climber. It is always attractively clean in appearance and where hardy should be freely used. C. Baueri var. variegata, the variegated form, grows more slowly but is one of our most attractive variegated shrubs. Sensitive to frost.

CORNUS NUTTALLII (20), the familiar wild dogwood, has large white blossoms followed by red fruits. C. capitata, the evergreen dogwood, is more amenable to cultivation.

COTONEASTER—The Cotoneasters are hardy shrubs many of which bear lovely berries and they are excellent material for landscape purposes. Cotoneaster microphylla is a prostrate shrub, useful for facing, for covering banks, or for use at the junction of paths. It has small white flowers and large red berries. C. microphylla var. thymifolia has smaller leaves than the type. Cotoneaster horizontalis has the same prostrate habit but is deciduous. However, it is not without leaves except for a few weeks and in frost-free sections does not lose its leaves. C. Franchetii (5) is a graceful shrub with arching branches. Its flowers are pink and its berries of salmon red. C. pannosa (10) is also a lovely shrub of much grace, bearing great quantities of rich red berries. All of these may be highly recommended.

CYTISUS MULTIFLORUS (5), the Portugal broom, is a moderate sized shrub bearing numerous white, pea-shaped blossoms. C. racemosus is decidedly floriferous having yellow flowers in long racemes.

DIERVILLA FLORIDA (5), the pink weigela, is one of our best spring flowering shrubs. Its branches then are covered with bell shaped pink flowers. Deciduous.

DIOSMA ERICOIDES (3), or breath of heaven seems to have universal appeal. Its foliage is very fine and it has white, star-shaped flowers borne in such profusion as to cover the entire bush. Place it toward the front of the shrubbery group.

ELEAGNUS PUNGENS var. VARIEGATA (6) is a strong growing bush with variegated foliage.

ERIOBOTRYA JAPONICA, the loquat, makes an excellent shrub or low tree, having attractive, bold foliage and golden fruits.

ERICA—We have a wide variety of heathers which are low growing shrubs with very fine leaves. Most of them bear dainty bell-shaped flowers. The most

desirable of these for school use are E. melanthera (4), E. mediterranea (3), and E. persoluta (3). They should be used as facers. Moisture loving.

ESCALLONIA—This genus gives us many helpful shrubs. E. montevidensis (10) bears compact panicles of white blossoms in late summer. E. pulverulenta (15) resembles E. montevidensis but its flower clusters are less compact. E. Langleyensis (10) has the same habit and appearance but its flowers are a pale pink. E. rubra (4) is a low growing shrub with deep rose colored blossoms. E. rosea (10) has pink flowers and is a good background shrub.

EUGENIA APICULATA (4) (Myrtus luma) is an attractive shrub of compact growth with leaves of very dark green. It may be used in an informal group, as a hedge, or trimmed to form. E. myrtifolia (30) is a handsome tall shrub of erect habit. Its leaves are tipped with bronze and its flowers are cream colored and are followed by purplish red fruits. It is a compact shrub. E. Hookeriana greatly resembles E. myrtifolia but grows less compactly and more rapidly. Both are desirable shrubs for accenting main architectural features. Sensitive to frost.

EVONYMUS JAPONICA (15) is a dark green shrub which may be used as a tall shrub, or clipped for hedge purposes. The E. japonica var. microphylla is a dwarf form with small leaves. E. j. var. viridivariegata (5) (Duc d'Anjou) has a spreading habit. Its leaves are green at the edges and striped with pale green and light yellow. E. radicans and its variegated form are useful where low ground cover is desired. The forms of Evonymus japonica should be planted in full sun as they are susceptible to mildew. They are especially successful in the interior valleys.

FATSIA JAPONICA (6) should only be used for accent. Its leaves are large and glossy. It thrives best in partial shade. F. papyrifera (12), the Chinese rice-paper plant, gives a tropical effect. Large palmate leaves are held high, clustered at the head of a tall stalk. Freeze.

FEIJOA SELLOWIANA (6), the pineapple guava, makes a good bush and its fruits, which are edible, ripen in warm climates.

GARRYA FREMONTII (8) is a native oaklike shrub bearing pendulous catkins of greenish white blossoms. These are often twelve inches in length, making it a showy plant.

GREVILLEA THELEMANNIANA (5) is a splendid shrub and is highly recommended for climates where it is hardy. It grows rapidly and blossoms freely throughout the year, its flowers being interesting in shape and rich coral in color.

HAKEA SUAVEOLENS (10) is a very drouth resistant plant with stiff needle-like foliage and is useful for dry hillsides or for hedges.

HYDRANGEA OPULOIDES (6) (hortensia section), our common hydrangea, gives a charming effect when planted in the shade. Deciduous.

HYPERICUM MOSERIANUM is a prostrate shrub valuable as a facer, for ground cover, or in a border. It has large yellow flowers and blooms freely.

LAURUS NOBILIS (30), the bay tree, is the historical laurel of the Greeks. It grows erectly and branches close to the ground. It is commonly used for tub plants either with a straight stem and compact head or in pyramidal form.

LEPTOSPERMUM LAEVIGATUM (15), the Australian tea, is one of our most adaptable shrubs, having many good qualities. It is graceful in habit, grows rapidly, bears a profusion of dainty white flowers, and is drouth resistant. It may be used as a background shrub, a filler, or a facer. It also makes an excellent hedge. L. scoparium var. Nicholii is a slow growing shrub which adds a touch of rich carmine to a group in late spring when its flowers are in season.

LIGUSTRUM—This genus is comprised of many species of rapid growth. Several of these may be used as hedge plants. L. ovalifolium, the California privet, gives a quick effect and is one of our best low priced hedge plants. It is partially deciduous. L. lucidum (20), one of the tree privets, may be used as a tree or for hedge purposes. L. japonicum is leathery leaved, bearing fragrant white blossoms.

LONICERA NITIDA (5), the evergreen bush honeysuckle, is a useful shrub. It may be used as a substitute for box where a low edging is desired. It may be trained as a low climber or used as a facing shrub. It has a graceful fern-like habit and its leaves are small and glossy.

MAGNOLIA SOULANGEANA and stellata are deciduous magnolias whose lovely blossoms are strikingly effective, blooming as they do against the background of bare branches. These may be trained as vines.

MAHONIA AQUIFOLIUM (5), the Oregon grape, has holly-like leaves and yellow flowers which are followed by purple fruits.

MAYTENUS BOARIA is a handsome tall shrub of slender grace. Its flowers are inconspicuous and its fruits scarlet.

MELALEUCAS share the name bottle brush with the Callistemons. They are quick growing shrubs and drouth resistant. Some desirable varieties are M. armillaris, M. hypericifolia, M. Wilsonii, and M. nesophila. Melaleuca hypericifolia has handsome red flowers.

MYRTUS is a genus of shrubs with fine, aromatic leaves and small white flowers followed by berries. They thrive especially well in hot climates. M. communis (10) is our common myrtle. M. c. var. microphylla (3) is a small leaved plant making a compact growth. M. Ugni (4) is slow growing but very attractive and its fruits have a very agreeable taste.

NANDINA DOMESTICA (6), or sacred bamboo, is well adapted to the valley climate where the graceful foliage on bamboo-like branches becomes rich with autumn color.

NERIUM OLEANDER—The oleanders are well known shrubs. They are free blooming in the warm sections of the state and as there are good varieties in many colors they are valuable for the enlivenment they give to the planting scheme. It should be remembered that all parts of the oleander are poisonous when eaten. The oleander is not a success in the cooler coast sections.

PHILADELPHUS CORONARIUS (12), our mock orange, is well known and much loved because of its abundance of fragrant wax-like flowers.

PHOTINIA ARBUTIFOLIA (12), our native toyon, deserves a place in every school ground. P. serrulata (16) gives a touch of charm when its long leaves resembling those of the rubber plant become bright with autumn tints.

PIMELEA FERRUGINEA (3) is a compact, low growing shrub which becomes covered with heads of pink blossoms making it a veritable bouquet. It requires careful attention during its early growth.

PITTOSPORUM—The Pittosporums are exceedingly satisfactory shrubs. Most of them make excellent hedges. The most useful for this purpose are P. eugenioides, tenuifolium, rhombifolium, and crassifolium. P. undulatum may also be used for hedge purposes but is not so hardy as the other varieties. All of these grow tall and are good background material. P. Tobira (4) is a low growing, compact shrub with fragrant white flowers which are followed by large light yellow fruits. It is a good facer. P. T. var. variegata, the variegated form, is much like it and an attractive variegated shrub.

PLUMBAGO CAPENSIS (8) where hardy is a desirable plant. The light blue plumbago is especially attractive and it is free flowering throughout many months of the year. When combined with shades of dull orange or light pink, lovely effects are secured.

POLYGALA DALMAISIANA (4) is a hardy and sturdy plant with magenta, pea-shaped flowers. If care is taken not to plant it near conflicting colors, it will prove satisfactory as it blooms throughout the year.

PRUNUS LAUROCERASUS (25), the English Laurel, has large shiny green leaves that make it an excellent foil for colorful shrubs. P. ilicifolia (20), the California evergreen cherry, has holly-like leaves. It may be used for hedges and for informal mass planting in dry places. P. ilicifolia var. integrifolia (20), the Catalina cherry, resembles it but has coarser leaves and is sturdier. P. lusitanica (25), the Portugal laurel, has dark green leaves, grows very slowly but compactly, and both it and the English laurel have spikes of white flowers. P. caroliniana (30) is a slender tree which may be used to give vertical accent in climates where the Eugenia myrtifolia does not thrive.

PUNICA—The pomegranates thrive in our climate and bloom freely. The edible pomegranate. Punica Granatum, and P. G. var. nana, the dwarf pomegranate are attractive when bare of leaves with their reddish stems; the fresh foliage is showy bronze, and the brilliant scarlet blossoms are freely produced.

PYRUS—Our flowering crab apples are universally popular. Desirable varieties are P. spectabilis, P. coronaria, P. pulcherrima, and P. micromalus (the so-called "Kaido").

RAPHIOLEPIS UMBELLATA (6) is a hardy, compact shrub with dull leathery leaves. Its small white flowers are followed by dark berries. It makes a satisfactory facer under trying conditions.

RHODODENDRON OBTUSUM var. HINODIGIRI (Azalea Hinodigiri) (1-2), the Japanese azalea, is suitable for cool, moist climates where its profusion of brilliant crimson blossoms make it a desirable shrub for spring effect. It must be placed at the front of the planting.

RIBES SANGUINEUM var. GLUTINOSUM, the wild currant, is another of our natives that should be planted freely.

SOLLYA HETEROPHYLLA, the Australian blue bell, is a prostrate shrub which may be trained as a low vine. It has attractive foliage and dainty, bell-like flowers in delicate blue that combines well with shades of light pink.

SORBUS AUCUPARIA, the mountain ash, is a slender, erect accent shrub and is very beautiful when its clusters of bright berries are in season.

SPARTIUM JUNCEUM (10), the Spanish broom, is useful for its color alone and must be planted well to the rear of the shrubbery group. However, it blooms continuously and adds color to the garden during dull seasons. Spartium j. var. nana, the dwarf Spanish broom, is low growing and compact.

SPIREA CANTONIENSIS and S. Vanhouttei are valuable for the masses of white blossoms that cover them in the springtime. S. Vanhouttei (5) is deciduous while S. cantoniensis (8) is practically evergreen.

STREPTOSOLEN JAMESONII is a colorful shrub with orange, trumpet-like flowers that bloom over a long period. It may be trained as a low vine. Tender.

SWAINSONIA GALEGIFOLIA var. ALBIFLORA (3), a floriferous shrub with white pea-shaped flowers, is especially attractive against a background of green or in contrast with red flowers.

SYRINGA VULGARIS, our common lilac, is so closely associated with spring's return that it has sentimental value as well as beauty. The white varieties are seldom satisfactory. Deciduous.

TAMARIX PENTANDRA (10) and T. parviflora, the tamarisks, are lovely bowers of pink when in bloom and also have attractive, graceful branches when they are covered with their minute, light green foliage. Deciduous.

TECOMARIA CAPENSIS (4) may be used as a shrub or trained as a vine. It has good, glossy foliage and bright orange red flowers. Not very hardy.

ULEX EUROPAEUS (8), the gorse, is useful as a cover for unsightly banks. It will withstand the severest of conditions.

VERONICA—This genus gives us a great variety of hardy, facing material. Avoid V. imperialis whose magenta blossoms conflict with much of our garden material. Desirable varieties are V. elliptica, speciosa var. Andersonii, buxifolia, Traversii, and chathamica.

VIBURNUM TINUS (8), the common laurustinus, has dark leaves, and flowers in large heads that are pinkish while in bud but white when opened. V. t. var. lucidum is a great improvement over the type, having large, handsome foliage, and great clusters of beautiful white flowers. It should be freely used. V. t. var. strictum is of slender, erect habit. V. odoratissimum has lovely autumn foliage. V. tomentosum var. plenum, the Japanese snowball, blooms very freely. It is deciduous.

PERENNIALS.

ACANTHUS MOLLIS is a plant with large, bold foliage. It grows rapidly and each plant should be given ample space.

AGAPANTHUS UMBELLATUS, the blue African lily, is a tuberous plant with long, flat, strap-like leaves that grow compactly from the tuber. The flowers grow in umbels at the head of a tall stalk.

ALTHAEA ROSEA, our garden hollyhocks, are generally familiar. They may be secured in many good colors. When planted so that their blossom stalks grow above a wall or peer over the shrubbery group, they appear to good advantage. If cut down immediately after the blooming period is ended a second crop of flowers will be secured.

ALYSSUM SAXATILE has grayish foliage and bright yellow blossoms. It is drouth resistant and makes a successful rock plant or edging.

ANEMONE JAPONICA, the Japanese Anemone, is a useful perennial with large flowers of white or pink appearing in autumn. Clumps of the white varieties planted in fern beds prove especially attractive.

AQUILEGIA CHRYSANTHA and its hybrids, the long spurred columbines, are exceedingly graceful, and lovely in delicate colors.

CALCEOLARIA INTEGRIFOLIA is a shrubby perennial with clusters of flowers, each flower being pouch-like and colored a clear yellow or brownish yellow with rich colorings of velvety brown.

CAMPANULA PERSICIFOLIA, the peach leaved bell flower, is a popular perennial. Its foliage grows close to the ground, making a compact mass from which slender spikes are sent up. Many bell-shaped flowers of blue or white grow along the stem. C. Grosseckii has a similar habit with flowers of violet.

CENTRANTHUS RUBER or red valerian is a drouth resistant, free flowering, strong growing perennial.

CERATOSTIGMA PLUMBAGINOIDES (Plumbago Larpentae) is a low perennial with reddish brown branches and flowers shaped like those of the plumbago but in the richest of blue, collected in dense umbels.

CHRYSANTHEMUM HORTORUM in pompon varieties gives a fine fall effect and is excellent for cutting. C. frutescens, the white marguerite, is a free flowering plant and commonly known, while its double form, Mrs. Fred Sander, is even more attractive. The yellow form has flowers slightly larger in lemon. C. leucanthemum hybridum was originated by Luther Burbank and is an improved Shasta daisy having much larger flowers than the other daisies.

DAHLIA IMPERIALIS, the tree dahlia, is a handsome plant whose stalk often reaches a height of fifteen feet. It has large good looking leaves and its flowers are single in immense drooping clusters in a lovely shade of pink.

DELPHINIUM ELATUM HYBRIDUM, the perennial larkspurs, are free flowering and can be secured in the best shades of blue. They require good culture.

DIANTHUS PLUMARIUS, the pheasant's eye pink, makes a neat edging or a pleasing clump for the base of low shrubbery. Its flowers are fragrant and borne profusely.

DIGITALIS PURPUREA, the foxglove, is a shade lover. The foxgloves send up stems from four to eight feet in height bearing flowers in white and shades of pink all of which are much spotted.

ERIGERON MUCRONATUS, the Mexican daisy, is a drouth resistant, low growing trailer.

FELICIA AMELLOIDES, the blue daisy, grows rapidly bearing an abundance of light blue, daisy-like flowers.

GAZANIA SPLENDENS is useful as a cover for banks, for parking strips, or for borders. It requires little attention and blooms freely, its blossoms being of brilliant orange yellow.

GEUM COCCINEUM, "Mrs. Bradshaw," has double red flowers that are borne on a much branched stem.

HEUCHERA MICRANTHA, the wild alum root, has attractive foliage which colors richly in the winter time. Its flowers are inconspicuous being white and small. H. sanguinea is one of our best border plants. Its handsome foliage grows close to the ground and slender spikes of exquisite bell-like flowers of deep coral pink are sent up. It may be used freely with great effectiveness.

IRIS GERMANICA, commonly called Fleur-de-lis, is a hardy perennial. Many new varieties in fascinating shades are procurable. Among the many species of iris that are obtainable, some of the best for school use are I. flavescens, I. sibirica, I. unguicularis, I. Monnieri, and I. orientalis.

KNIPHOFIA UVARIA, the red hot poker plant, has spikes reaching four feet in height with red flowers tipped with yellow. It gives an excellent color accent during the dull winter months but should be used with moderation.

LANTANA CAMARA is a brilliant plant when its orange colored flowers are in blossom. It may be trained as a vine. The prostrate forms are valuable as color accents at the base of shrubbery.

LAVENDULA VERA is the old fashioned lavender.

LIPPIA CANESCENS is an excellent substitute for grass where little care can be given a lawn. It grows rapidly and is drouth resistant but its leaves often freeze in frosty belts. However, new leaves are again in evidence with the first warm weather.

LOTUS BERTHOLETII, the coral gem, has gray foliage and a pendulous habit that makes it useful for hanging baskets or window boxes. Its coral colored flowers prove strikingly brilliant against the background of gray foliage.

PELARGONIUM HORTORUM is the common geranium which is an adaptable plant. P. peltatum, the ivy geranium, has smooth leaves, is a good climber, and makes an excellent wall cover.

PENTSTEMON GLOXINIOIDES is an exceptionally successful and attractive perennial. The pentstemons make a thick growth at the base and bloom freely during many months of the year, giving much cheer to the garden at the Christmas season. The flowers are similar to those of the snapdragon being especially pretty in shades of light pink and in bright red.

ROMNEYA COULTERI, the Matilija poppy, requires much space and should be planted in the rear of the shrubbery group. Its leaves are silvery and its poppy-like flowers are large and clear white with yellow centers. They are fragrant and attractive, the plant blooming during the summer months.

SALVIA LEUCANTHA, the purple sage, gives a touch of rich color and makes rapid growth.

SAXIFRAGA CRASSIFOLIA is an excellent plant for the winter garden. It has large, good looking leaves and its flowers are pink. It may be used as an edging, in rock planting, or at the base of shrubbery groups.

VERBENA HYBRIDA, the common verbena, is an excellent bedding plant and can be secured in good colors.

VINCA MINOR, the small leaved periwinkle, is a lovely plant and adds a charming touch to the garden if used as a ground cover under shrubbery. It has small flowers of white or blue.

VINES.

AKEBIA QUINATA is a partially deciduous vine with dense foliage and flowers of purple borne in racemes.

FICUS PUMILA, the creeping fig, is an evergreen climber which adheres closely to walls by its tendrils. Its leaves are small and dark green.

HEDERA HELIX, the English ivy, is useful for covering banks. It is not recommended for use on walls of buildings.

JASMINUM PRIMULINUM, the double yellow jasmine, has clear yellow flowers and is evergreen. J. officinale, the common jasmine, has finely pinnate leaves and flowers that are small, white, and very fragrant. Partially deciduous.

LONICERA JAPONICA provides quick growing floriferous vines. L. j. var. chinensis has leaves of dull green that are purplish in the new growth. Its flowers are white inside and purplish without. L. j. var. Halliana has leaves of bright green and flowers of white that change to yellow before falling.

PARTHENOCISSUS TRICUSPIDATA, the Boston ivy, has dense, glossy foliage and tenacious tendrils that adhere closely to walls. Its foliage becomes red in the fall before dropping.

PASSIFLORA—The passion vines grow rapidly and are useful where quick effects are desired. P. caerulea is the blue passion vine. P. manicata, the scarlet passion vine, blooms very freely. P. mollissima, the pink passion vine, has rose colored flowers. The scarlet and pink varieties are not hardy.

PHAEDRANTHUS BUCCINATORIUS, one of the trumpet vines, is an evergreen vine with long trumpet-like flowers of brilliant red. Not hardy.

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PLUMBAGO CAPENSIS may be used as a vine as well as a shrub. See shrubs.

SOLANUM JASMINOIDES, the potato vine, is a rapid growing evergreen with flowers resembling those of the potato.

TRACHELOSPERMUM JASMINOIDES, the star jasmine, is an evergreen vine which has many fragrant white flowers.

WISTERIA FLORIBUNDA (W. multijuga), the Japanese wisteria, has long racemes. It may be secured in white, pink, or lavender varieties. W. sinensis, the Chinese wisteria, has compact racemes of light purple which appear before the leaves.

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